

REMARKS

Claim 27 has been amended to correct an informality. Upon entry of this Amendment, claims 1-29 remain pending.

In the Office Action dated January 12, 2005, claims 1-7, 9-24, and 26-29 were rejected under 35 U.S.C. §102(b) as being anticipated by Silfvast et al. (U.S. Patent No. 6,232,613). Applicant respectfully traverses this rejection.

Independent claim 1 recites a lithographic projection apparatus that includes, *inter alia*, a radiation system, comprising a radiation source, and an illumination system that supplies a beam of radiation, an electrode, and a voltage source that applies an electric field between the radiation source and the electrode to generate a discharge between the radiation source and the electrode. Silfvast et al. does not disclose or suggest all of the features of claim 1.

Silfvast et al. teaches an angular pumped and emitting capillary (APEC) discharge source for applications in EUV lithography, microscopy, materials processing, metrology, and resist analysis. (Silfvast et al. at col. 3, lns. 1-4.) The discharge source (100) includes metal electrodes (110, 130) at opposite ends of the discharge source (100). (Silfvast et al. at FIG. 2.) When voltage (V) is applied to the electrodes (110, 130), an electric field is generated within the flowing gas (G) that causes electrons to be accelerated and collide with gaseous atoms to highly excited and ionized states that radiate the desired light. (See Silfvast et al. at col. 4, lns. 26-35.) Thus, the electrodes (110, 130) disclosed by Silfvast et al. are part of the discharge source (100), and the electric field that is generated is within the discharge source (100). (Silfvast et al. at FIG. 2.) In contrast, claim 1 recites a lithographic projection apparatus that includes, *inter alia*, a radiation source, an electrode, and a voltage source that applies an electric field between the radiation source and the electrode.

Moreover, no where does Silfvast et al. disclose a lithographic projection apparatus. Silfvast et al. merely teaches a discharge source that may be used in a variety of applications, including EUV lithography. (Silfvast et al. at col. 3, lns. 1-4.) The Examiner has taken the position that Silfvast et al. “discloses a lithographic projection apparatus and corresponding method (see col. 3, lines 1-4) and comprising all basic features of the instant claims: an electrode (10, 30) and voltage source (V) that applies an electric field between the radiation source and the electrode....” (Office Action at page 2.) The Examiner has also taken the position that Silfvast et al. “does not specifically disclosed [sic] the claimed radiation source, a support structure for supporting a patterning structure, a substrate support for supporting a

substrate, and a projection system for projecting the patterned beam onto the substrate” (Office Action at page 2), but relies on the doctrine of inherency to make up for the missing elements. This is an improper application of the doctrine of inherency. The fact that Silfvast et al. discloses that its discharge source may be used in EUV lithography does not make it clear that a lithographic projection apparatus with all of the features of claim 1 is necessarily present in the disclosure of Silfvast et al. (See MPEP § 2112 (“In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” *Ex parte Levy*, 17 USPQ2d 1461,1464 (Bd. Pat. App. & Inter. 1990)(emphasis in original).) As Silfvast et al. discloses nothing about a lithographic projection apparatus, other than the use of an APEC discharge source in EUV lithography, it is respectfully submitted that Silfvast et al. cannot necessarily include the features of claims 1, 7, 19, 21, 22, and 27-29, as asserted by the Examiner.

Accordingly, Applicant respectfully submits that claim 1 is patentable over Silfvast et al., and respectfully requests that the rejection of claim 1, and claims 2-7, 9-18, and 28 that depend therefrom be withdrawn.

Independent claim 19 recites a radiation system that includes a radiation source, an electrode, and a voltage source. The voltage source applies an electric field between the radiation source and the electrode, and generates a discharge between the radiation source and the electrode to capture contaminant particles from the radiation source.

As discussed above, Silfvast et al. discloses an APEC discharge source (100) that includes electrodes (110, 130). The electric field is generated between the internal electrodes of the discharge source (100) within the discharge source (100). In contrast, claim 19 recites that the electric field is between the radiation source and the electrode.

Accordingly, Applicant respectfully submits that claim 19 is patentable over Silfvast et al. and respectfully requests that the rejection of claim 19 and claim 20 that depends therefrom be withdrawn.

Independent claim 21 recites a device manufacturing method using a lithographic apparatus. The method includes providing a beam of radiation with a radiation source, patterning the beam of radiation, projecting the beam of radiation onto a target portion of the substrate, providing an electrode positioned downstream, relative to a direction of propagation of the beam of radiation, of the radiation source, and applying an electric field

between the radiation source and the electrode to generate a discharge between the radiation source and the electrode.

Silfvast et al. is discussed above. No where does Silfvast et al. disclose or suggest such a method. The Examiner's application of the doctrine of inherency to make up for the deficiencies of Silfvast et al. is improper. The fact that Silfvast et al. discloses that its discharge source may be used in EUV lithography does not make it clear that a device manufacturing method with all of the features of claim 21 is necessarily present. (See MPEP § 2112 and discussion above.) Moreover, the electrodes (e.g. 110, 130) of Silfvast et al. are part of the discharge source (100). Thus, Silfvast et al. does not disclose or suggest providing an electrode positioned downstream, relative to a direction of propagation of the beam of radiation, of the radiation source, and applying an electric field between the radiation source and the electrode to generate a discharge between the radiation source and the electrode, as recited in claim 21.

Accordingly, Applicant respectfully submits that claim 21 is patentable over Silfvast et al. and respectfully requests that the rejection of claim 21, and claims 22-24, 26 and 29 that depend therefrom be withdrawn.

Independent claim 27 recites a method for debris suppression of an ionizing radiation system. The method includes providing a radiation source, providing an electrode, and applying an electric field between the radiation source and the electrode to generate a discharge between the radiation source and the electrode.

Silfvast et al. is discussed above. No where does Silfvast et al. disclose or suggest such a method. The electrodes (e.g. 110, 130) of Silfvast et al. are part of the discharge source (100). Thus, Silfvast et al. does not disclose or suggest applying an electric field between the radiation source and the electrode to generate a discharge between the radiation source and the electrode, as recited in claim 27.

Accordingly, Applicant respectfully submits that claim 27 is patentable over Silfvast et al. and respectfully requests that the rejection be withdrawn.

In the Office Action, claims 8, 23, and 25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Silfvast et al. in view of Moors et al. (U.S. Patent No. 6,781,673). Applicant respectfully traverses this rejection.

Applicant brings to the Examiner's attention that Moors et al. cannot be used as prior art under 35 U.S.C. §103(a), because Moors et al. only qualifies as prior art under 35 U.S.C. § 102(e), and at the time the invention was made, the subject matter of Moors et al. and the

present claimed invention were commonly owned by ASML Netherlands B.V. (*See*, 35 U.S.C. §103(c) and MPEP §06.02(l)(1).) Moreover, Applicant and Moors et al. were under an obligation to assign the present application and Moors et al., respectively, to ASML Netherlands, B.V. The instant application is assigned to ASML Netherlands B.V. by way of assignment filed May 21, 2004, and recorded at reel 015363, frame 0867. A copy of the Notice of Recordation is enclosed.

Moreover, the combination of Silfvast et al. and Moors et al. does not even disclose or suggest all of the features of claims 8, 23, and 25. Claim 8 depends from claim 1, discussed above, and adds the feature "wherein said voltage source is arranged to generate a square-wave modulated electric field that is synchronized with the radiation source." As conceded by the Examiner, Silfvast et al. does not disclose or suggest this feature. Likewise, nowhere does Moors et al. disclose or suggest a voltage source that is arranged to generate a square-wave modulated electric field that is synchronized with the radiation source. Moors et al. discloses that an alternating voltage can be provided between electrodes (11, 12) to generate a plasma that is confined between the electrodes. (Moors et al. at col. 9, lns. 21-24.) Moors et al. does not disclose or suggest that the voltage source generates a square-wave modulated electric field that is synchronized with the radiation source. Accordingly, Applicant respectfully submits that claim 8 is patentable over Silfvast et al. in view of Moors et al. and respectfully requests that the rejection to claim 8 be withdrawn.

Claim 23 depends from claim 21, discussed above, and adds the feature "wherein the electric field is square-wave modulated and synchronized with the radiation system." As conceded by the Examiner, Silfvast et al. does not disclose or suggest this feature. Moors et al. is discussed above and also does not disclose or suggest this feature. Accordingly, Applicant respectfully submits that claim 23 is patentable over Silfvast et al. in view of Moors et al. and respectfully requests that the rejection to claim 23 be withdrawn.

Claim 25 also depends from claim 21, discussed above, and adds the feature "wherein the electric field between the radiation source and the electrode has a voltage difference up to about 1000V." Moors et al. discloses that a potential difference between electrodes (11, 12) may be about 10 kV. (Moors et al. at col. 8, lns. 40-41.) The portion of Moors et al. that the Examiner seems to rely on discusses a field strength, not a voltage difference between the radiation source and the electrode, as claimed. Accordingly, Applicant respectfully submits that claim 25 is patentable over Silfvast et al. in view of Moors et al. and respectfully requests that the rejection to claim 25 be withdrawn.

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All rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited. If any point remains at issue which the Examiner feels may best be resolved through a personal or telephone interview, please contact the undersigned at the telephone number below.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

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TITLE: LITHOGRAPHIC APPARATUS WITH DEBRIS SUPPRESSION, AND DEVICE
MANUFACTURING METHOD

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